BROOKHAVEN NATIONAL LABORATORY
NATIONAL SYNCHROTRON LIGHT SOURCE

MEMORANDUM

DATE: 5 June 2000

TO: Sam Krinsky, Michael Hart, Richard Osgood, Peter Paul

CC: NSLS Management Group, FEL Project Team

FROM: William S. Graves, Richard Heese, Erik D. Johnson

SUBJECT: **DUV-FEL Project Report; Period ended 2 June 2000**

Work in Progress:

We brought the machine back up last week with some drop-out problems on RF system A. Much of the time was spent in tuning, testing, and general system shake-out. As of this writing, the klystron Tank A oil is being drained to inspect the components (see below). The streak camera from Hammamatsu arrived on Thursday, and various tests were performed by Brian Sheehy using the laser system. The results from these measurements are still being analyzed, but the camera performs with resolution of 2 ps or better.

Paul Emma visited from SLAC to help develop our machine lattice. We studied the effects of alignment errors, wakefields, and coherent synchrotron radiation generation on electron bunch compression and emittance. His simulations indicate that emittance growth is small for rms alignment errors of 500 microns (our spec is 125 microns), that wakefield effects are not severe, and that CSR emittance growth is about 20-30% for our design parameters, which agrees with previous estimates. We will continue to develop the simulations based on measured data.

Work Planned for Next Week:

The early part of the week will be given over to remediation of any problems found in the RF system A klystron tank and improving our tools for commissioning the machine. The beam position monitors will be calibrated and used to measure beam charge. To refine our trajectory analysis, a tracking HeNe will be used to establish a straight-line fiducialization for the YAG screen monitors. RF control software is being developed and installed that will allow independent control (via computer) of the phase of any of the three components driven by RF system A by synchronously adjusting the phase shifters as required. The electricians will pull the cables required for camera triggering so we can get quantitative beam profiles. Our plan is to bring the machine back up on Thursday, and resume commissioning. We will be looking at the gun/solenoid performance and start making emittance measurements to see what we really have.

Management:

Generally, having threaded beam through the machine, we are moving to the next level of sophistication in our commissioning efforts. Once we have a handle on the current measurements we will resume fault studies, probably into the following week (12 June).